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On the Variation Problem and Quasilinear Elliptic Equations With Multiple Independent Variables

(3) $L_1(u) \equiv a_{ij}(x,u,u_{x_k})\, u_{x_i x_j} + a(x,u,u_{x_k}) = 0$

assume that it belongs to the class $C_3(\Omega) \cap C_1(\bar{\Omega})$ and satisfies

(2) $u|_s = \varphi(s)$.

For $a_{ij}(x,u,p_k)$, $a(x\ u\ p_k) \in C_1(\Omega \times E_1 \times E_n)$ let (B) and

(7) $\nu(|u|)(p^2+1)^{m/2-1} \leqq a_{ij}(x,u,p_k)\, \xi_i \xi_j \leqq \mu(|u|)(p^2+1)^{m/2-1}$

be satisfied for $\sum \xi_i^2 = 1$. Then the author estimates $\max\limits_{\Omega} |u_{x_i}|$ by $\max\limits_{\Omega} |u|$ and $|\varphi|_{C_{2,0}(s)}$, if the oscillation of $u(x)$ is small in Ω and S belongs to $C_{2,0}$.

Theorem 2: If the conditions of theorem 1 are satisfied except those for S and φ, then $\max\limits_{\Omega} |u_{x_i}|$ is estimated by $\max\limits_{\Omega} |u|$ for every $\Omega' \subset \Omega$.

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Theorem 3: Modification of theorem 1 under renunciation of the small oscillation of $u(x)$.

Theorem 4 and 5 give similar statements on the estimations of the norms of solutions for the equation

$$(4)\quad M_1(u) \equiv \frac{\partial}{\partial x_i}\left(a_i(x,u,u_{x_k})\right) + a(x,u,u_{x_k}) = 0$$

where in theorem 4 the author assumes that

$$(9)\quad a_i(x,u,p_k)\, p_i \geqq \nu(|u|)\, p^m, \quad p \gg 1 \quad .$$

§ 2. Theorem 6 is the statement of existence for the problem

$$(10)\quad M_\tau(u) \equiv \tau M_1[u] + (1-\tau)\, M_0(u) = 0\ , \quad u\big|_S = \tau\, \varphi(s),$$

where

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$$M_0(u) = \frac{\partial}{\partial x_i} F^o_{u_{x_i}} - F_u^o, \quad F^o(x,u,u_{x_k}) = \left(\sum_i u^2_{x_i} + 1\right)^{m/2+\mu^2}.$$

Theorem 7: For (3) let (B) and (7) be satisfied for n = 2, where m = 2 is assumed without restriction of generality. Let

$|a(x,u,p_k)| \leqq \mu(|u|)(p^2 + 1)^{1-\varepsilon}$, $\varepsilon > 0$ be instead of (6).

Then the problem $L_\tau(u) \equiv \tau L_1(u) + (1-\tau)(\Delta u - u) = 0$, $u|_S = \tau\varphi(s)$ possesses at least one solution $u(x,\tau)$ from $C_{2,\alpha}(\bar{\Omega}) \cap C_{3,\alpha}(\Omega)$ for all $\tau \in [0,1]$, if the values $u(x,\tau)$ are uniformly bounded for all such possible solutions $u(x,\tau)$. The functions a_{ij}, a must be belong to $C_{1,\alpha}$, $\varphi \in C_{2,\alpha}$, $S \in C_{2,\alpha}$, Ω homeomorphic to the circle.

§ 3. The variation problem

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(1) $\inf I(u) = \inf \int_{\Omega} F(x,u,u_{x_k})\, dx\ ,\ x = x_1, \ldots, x_n)$ is considered under the condition (2). Assume that $F(x,u,p_k)$ has the order of growth $m > 1$ in p and that every differentiation of F to p_k reduce this order at least by 1, while the order does not increase by differentiation with respect to x_n and u. Let

$$F(x,u,p_k) \geq \nu_1(|u|)\, p^m$$

(11)
$$F_{p_i p_j}(x,u,p_k)\, \xi_i\, \xi_j \geq \nu_2(|u|)(p^2+1)^{\frac{m-2}{2}} \sum \xi_i^2$$
$$F_{p_i}(x,u,p_k)\, p_i \geq \nu_3(|u|)\, p^m\ ,\quad p \gg 1\ .$$

Theorem 8: Let u be a generalized solution from $W_m^1(\Omega)$ of the "conditional" variation problem (1) - (2), i. e. of the problem completed by the condition that all comparison functions do not exceed a certain constant: $M \geq \max_S |u|$. The solution u belongs

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to $C_{o,\alpha}(\Omega)$, if $F \in C_1$ and if the conditions

$$\begin{aligned} &\mu(|u|)p^m \geq F_{p_i}(x,u,p_k)\,p_i \geq \nu(|u|)\,p^m, \quad p \gg 1 \\ &|F_u(x,u,p_k)| \leq \mu(|u|)\,p^m \end{aligned} \tag{12}$$

are satisfied. Under the same assumptions for F every bounded function $u \in W'_m(\Omega)$, for which $\delta I(u) = 0$, belongs to $C_{o,\alpha}(\Omega)$. If Ω satisfies the condition (A) and if $\varphi \in C_1$, then $u \in C_{o,\alpha}(\bar{\Omega})$.

Theorem 9. Under the conditions for F formulated at the beginning of § 3 every bounded generalized solution u(x) of the variation problem (1) - (2) from the class $W'_m(\Omega)$ belongs to $C_{k,\alpha}(\Omega)$, if $F \in C_{k,\alpha}$, $k \geq 3$ and $\Delta I(u) = I(u+\eta) - I(u) > 0$ for every sufficiently small local variation $\eta(x)$. If, however, $S \in C_{l,\alpha}$, $\varphi \in C_{l,\alpha}$, $2 \leq l \leq k$, then $u \in C_{l,\alpha}(\bar{\Omega}) \cap C_{k,\alpha}(\Omega)$.

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Finally the author gives two lemmata generalizing the lemma due to E. de Giorgi (Ref.4).

S. N. Bernshteyn is mentioned by the author.

There are 4 references: 2 Soviet, 1 Italian and 1 American.

[Abstracter's note: (Ref.1) is the book of C. Miranda: Partial Differential Equations of Elliptic Type].

ASSOCIATION: Leningradskiy gosudarstvennyy universitet imeni A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: June 10, 1960, by V. J. Smirnov, Academician

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AUTHORS: Ladyzhenskaya, O. A., Ural'tseva, N. N.

TITLE: Quasilinear elliptic equations and variational problems with several independent variables

PERIODICAL: Uspekhi matematicheskikh nauk, v. 16, no. 1, 1961, 19-90

TEXT: The paper is a general lecture which was given on November 24, 1959 on the occasion of the 80th birthday of S. N. Bernshteyn at the Leningrad Mathematical Society. The new results were represented in the seminaries of V. J. Smirnov (Leningrad) and J. G. Petrovskiy (Moscow) at the end of 1959.

Two problems are considered: 1.) the first boundary value problem for quasilinear elliptic equations

$$\sum_{i,j=1}^{n} a_{ij}(x,u,u_{x_k}) u_{x_i x_j} + a(x,u,u_{x_k}) = 0 \qquad (1)$$

and 2.) the differential properties of the generalized solutions

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$u(x_1, \dots, x_n)$ of the regular variational problem concerning the minimum of

$$I(u) = \int_{\Omega} F(x,u,u_{x_k})\, dx_1 \dots dx_n$$

under the condition $u/_S = \varphi(s)$.

Let Ω be a bounded domain of the $x = (x_1, \dots, x_n)$ in the Euclidean E_n; Ω' -- strictly interior subdomain of Ω; $C_{l,o}(\Omega)$ the set of all functions $u(x)$ which are continuous with respect to x_k in the open Ω together with the l first derivatives; let

$$|u|_{C_{l,o}(\Omega)} = \sum_{k=0}^{l} \max_{x \in \Omega} |D^k u(x)|$$

be the norm. Let $C_{l,\alpha}(\Omega)$ be the set of all functions from $C_{l,o}(\Omega)$ for which

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$$\max_{\substack{x, x+h \in \Omega \\ |h|>0}} \frac{|D^l u(x+h) - D^l u(x)|}{|h|^{\alpha}} = \Delta^{\alpha} D^l u$$

is bounded. The norm is: $|u|_{C_{l\alpha}(\Omega)} = |u|_{C_{l,o}(\Omega)} + \Delta^{\alpha} D^l u$. Let $C_o(\Omega)$ be the set of all functions continuous in Ω $|u|_{C_o\Omega} = \max_{x \in \Omega} |u(x)|$. Let $W_m^l(\Omega)$ and $\overset{o}{W}{}_m^l(\Omega)$ be defined as usual (see V. J. Smirnov (Ref. 2: Kurs vysshey matematiki [Course in higher mathematics] t. IV, M., Fizmatgiz, 1959)). $\max_{\Omega} |u(x)|$ for $u \in W_m^l(\Omega)$ is defined to be vrai $\max_{\Omega} |u(x)|$. Let $D_l(\Omega)$ be the class of the functions u(x) which in Ω possess l - 1 derivatives with respect to x_k, and for which the derivatives $D^{l-1}u$ possess a differential in every point of Ω. Let $O_l(Q)$ be the class of the $v(y_1, \ldots, y_m) \in D_l(Q)$, the l-th derivatives of which are bounded in every bounded domain of the $y_1, \ldots, y_m$.

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Let $O_o(1)$ be the class of the functions measurable and bounded in every finite domain of the $y_1, \ldots, y_m$. The statement " the norm $|\cdot|$ is estimated by the data of the problem" means that the estimation is possible by the constants which occur in the conditions which are fulfilled by the problem. $\mu_k(|u|)$ denotes positive nondecreasing and $\nu_k(|u|)$ positive nonincreasing functions of $|u|$ defined on $[0, \infty)$ and finite for all finite $|u|$. The statement "the function $f(x_1, \ldots, x_n, u, p_1, \ldots, p_n)$, $x \in \Omega$ has the order of growth $\leq m$ in $p = \sqrt{\sum_{k=1}^{n} p_k^2}$ " says that $\max_{x \in \Omega} |f(x,u,p_k)| \leq \mu(|u|)(p^2+1)^{m/2}$. The boundary S possesses the property (A), if there are $a > 0$, $0 < \theta < 1$ such that for every sphere $K(\varrho)$ with center on S and radius $\varrho \leq a$ it holds

$$\mathrm{mes}\,[K(\varrho) \cap \Omega] \leq (1 - \theta)\,\mathrm{mes}\,K(\varrho) .$$

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S belongs to $C_{1,\alpha}$, $\alpha \geq 0$, if it can be covered by a finite number of open pieces, the equations of which belong to $C_{1,\alpha}$.

Theorem I. Let u(x) be a bounded generalized solution of

$$M_1(u) \equiv \frac{\partial}{\partial x_i}\left(a_i(x,u,u_{x_k})\right) + a(x,u,u_{x_k}) = 0 \qquad (29)$$

i. e. $u \in W_m^1(\Omega)$, $|u| \leq M$ and u(x) is assumed to satisfy the inequality

$$\int_\Omega \left[a_i(x,u,u_{x_k})\eta_{x_i} - a(x,u,u_{x_k})\eta\right] dx = 0 \qquad (30)$$

for arbitrary $\eta(x) \in \overset{0}{W}{}_m^1(\Omega)$. Let furthermore $\max_\Omega |u_{x_i}| \leq M_1$, $a_i(x,u,p_k) \in C_1(\Omega \times E_1 \times E_n)$ and $a(x,u,p_k) \in C_0(\Omega \times E_1 \times E_n)$. Let

$$\frac{\partial a_i(x+\tau h, v, v_{x_k})}{\partial v_{x_j}} \xi_i \xi_j \geq \nu_1(|v|)\, \nu_2(|\nabla v|) \sum_{i=1}^{n} \xi_i^2$$

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for $v(x) = (1 - \tau)\, u(x) + \tau\, u(x + h)$, $\tau \in [0,1]$, x, $x + h \in \Omega$.
The norm $|u|_{C_{1,\alpha}}(\Omega')$, $\alpha > 0$, for arbitrary $\Omega' \subset \Omega$ is then estimated by $|u|_{C_{1,0}}(\Omega')$. If, moreover, $S \in C_{2,0}$ and $\varphi(s) = u/_S \in C_{2,0}(s)$, then $|u|_{C_{1,\alpha}}(\Omega)$ is estimated by $|u|_{C_{1,0}}(\Omega)$ and $|\varphi|_{C_{2,0}}(S)$. If a_i and a belong as functions of their arguments to $C_{1-1,\alpha}$ $(1 \geq 2)$ or to $C_{1-2,\alpha}$ on every compact, while S and $\varphi(s)$ belong to $C_{1,\alpha}$, then $|u|_{C_{1,\alpha}}(\Omega)$ is estimated by $|u|_{C_{1,0}}(\Omega)$ and by the data of the problem.
The equation (29) is said to belong to the class $(\exists)$, if it satisfies for arbitrary $\xi_1, \ldots, \xi_n$ the conditions

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$$\nu_1(|u|)(p^2+1)^{\frac{m-2}{2}} \sum_{i=1}^{n} \xi_i^2 \leq a_{ij}(x,u,p_k)\xi_i\xi_j \leq \mu_1(|u|)$$

$$(p^2+1)^{\frac{m-2}{2}} \sum_{i=1}^{n} \xi_i^2 \qquad (16)$$

$$|a(x,u,p_k)| \leq \mu_2(|u|)\, p^m + \mu_3(|u|) \qquad (17)$$

and for large p

$$a_i(x,u,p_k)\, p_i \geq \nu_1(|u|)\, p^m \qquad (m > 1), \qquad (31)$$

where $p^2 = \sum_{i=1}^{n} p_i^2$.

Theorem II. For an arbitrary equation (29) of the class ($\exists$) the first boundary value problem with the boundary condition $u/_S = \varphi(s)$ has at

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least one solution in the class $C_{2,\alpha}(\bar{\Omega}) \cap C_{3,\alpha}(\Omega)$, if the maxima of the absolute values of the solutions $u(x,\tau)$ of the boundary value problems

$$M_{\tau}(u) \equiv (1-\tau)\, M_0(u) + \tau M_1(u) = 0, \quad u/_S = \tau\varphi, \quad \tau \in [0,1]$$

are uniformly bounded, where $M_0(u) \equiv \frac{\partial}{\partial x_i} F^0_{u_{x_i}}(u, u_{x_k}) - F^0_u(u, u_{x_k})$ and $F^0(u, p_k) = (1+p^2)^{m/2} + u^2$. The coefficients $a_i(x,u,p_k)$ and $a(x,u,p_k)$ must belong to $C_{2,\alpha}$ and $C_{1,\alpha}$ respectively as functions of their arguments on every compact. The boundary S and $\varphi(s)$ must belong to $C_{2,\alpha}$.

Theorem III is a special case of theorem II.

Theorem IV. The propositions of theorem II are maintained, if all conditions except (31) are satisfied and if moreover the orders of growth in p of the functions

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$\frac{\partial^2 a_i(x,u,p_k)}{\partial p_j \partial u}$, $\frac{\partial^2 a_i(x,u,p_k)}{\partial u^2}$ and $\frac{\partial a(x,u,p_k)}{\partial u}$ are not greater than $m-2-\varepsilon$, $m-1-\varepsilon$ and $m-\varepsilon$, where $\varepsilon > 0$ is arbitrary.

Theorem V. Let $u(x) \in W_m^1(\Omega)$ be one of the generalized solutions of the variational problem

$$\inf I(u) = \inf \int_\Omega f(x,u,u_{x_k})\, dx, \quad dx = dx_1 \dots dx_n, \tag{2}$$

$$u/_S = \varphi(s) \tag{3}$$

with the additional condition that all comparison functions are in the absolute value not greater than a constant $M \geqslant \max_S |u|$. This solution belongs to $C_{0,\alpha}(\Omega)$, $\alpha > 0$, if

$$F(x,u,p_k) \in C_1(\Omega \times [-M, M] \times E_n)$$

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$$F_{p_i}(x,u,p_k)\, p_i \geqslant \nu_1(|u|)\, p^m \quad \text{for } p \gg 1$$

and

$$p \sum_{i=1}^{n} \left| F_{p_i}(x,u,p_k) \right| + \left| F_u(x,u,p_k) \right| \leq \mu_1(|u|)\,(p^m + 1) \quad .$$

Under the same assumptions on F, every bounded $u(x) \in W_m^1(\Omega)$, which gives I a stationary value belongs to $C_{o,\alpha}(\Omega)$. If, moreover, the boundary of Ω satisfies the condition (A), and if $\varphi(s)$ can be continued in Ω so that $\varphi(x) \in C_1(\Omega)$, then in both cases it holds $u(x) \in C_{o,\alpha}(\bar{\Omega})$.

Theorem VI. If only the natural restrictions 1.) - 4.) are satisfied for $F(x,u,p_K)$, then every bounded generalized solution $u(x) \in W_m^1(\Omega)$

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of the variational problem (2), (3) belongs to $C_{k,\alpha}(\Omega)$, $\alpha > 0$, if $F(x,u,p_k)$ as function of its arguments belongs to $C_{k,\alpha}$, $k \geqslant 3$ on every compact. If, moreover, $S \in C_{1,\alpha}$ and $\varphi \in C_{1,\alpha}$, $2 \leq 1 \leq k$, then u(x) belongs to $C_{1,\alpha}(\bar{\Omega})$ too. As natural restrictions for $F(x,u,p_k)$ there are denoted:

1.) $\nu_1(|u|)(p^2 + 1)^{m/2} \leq F(x,u,p_k) \leq \mu_1(|u|)(p^2 + 1)^{m/2}$

2.) The Euler equation for $F(x,u,p_k)$ is uniformaly elliptic.

((1) is called uniformly elliptic, if (16) holds).

3.) F is sufficiently smooth, where the differentiation of F and of its partial derivatives with respect to p_k reduces the order of growth of F and of the derivatives mentioned at least by 1, while the differentiation with respect to x_k and u does not increase these orders of growth.

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For all sufficiently large p it holds

$$F_{p_i}(x,u,p_k)\, p_i \geqslant \nu_2(|u|)\, p^m \; .$$

The given theorems are the main results of the paper; 25 theorems and 11 lemmata are proved.

The author mention: V. J. Kazimirov, A. G. Sigalov, A. J. Koshelev, G. J. Shilova, S. L. Sobolev, V. J. Plotnikov, A. D. Aleksandrov, A. V. Pogorelov, Ye. P. Sen'kin, J. Ya. Bakel'man.

There are 16 Soviet-bloc and 25 non-Soviet-bloc references. The four must recent references to English-language publications read as follows: L. Nirenberg, Estimates and existence of solutions of elliptic equations, Commun. Pure and Appl. Math. 9, 3(1956), 509-531;

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Quasilinear elliptic equations

J. Nash, Continuity of solutions of parabolic and elliptic equations, Amer. Journ. Math. 80, No. 4 (1958), 931-954; R. Finn and D. Gilbarg, Three-dimensional subsonic flows, and asymptotic estimates for elliptic partial differential equations, Acta math. 98 (1957), 265-296; C. B. Morrey, Second order elliptic equations in several variables and Hölder Continuity, Math. Z. 72 (1959), 146-164.

SUBMITTED: July 12, 1960

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AUTHORS: Ladyzhenskaya, O. A. and Ural'tseva, N. N.

TITLE: Differential properties of bounded generalized solutions to n-dimensional quasilinear elliptic equations and variation problems

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 1, 1961, 29-32

TEXT: The authors investigate the equation

$$\sum_{i=1}^{n} \frac{\partial}{\partial x_i} (a_i(x, u, u_x)) + a(x, u, u_x) = 0 \qquad (1)$$

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where a_i and a are measurable functions satisfying

$$|a_i(x, u, p_j)|\, p + |a(x, u, p_j)| \leq \mu(|u|)(1 + p)^m, \qquad (2)$$

$$a_i(x, u, p_j)\, p_i \geq \nu(|u|)\, p^m - \mu(|u|),$$

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where $m > 1$ and $p = \left(\sum_j p_j^2\right)^{1/2}$. Let besides the condition

$$\nu(|u|)(1+p)^{m-2}\sum_i \xi_i^2 \leqslant \frac{\partial a_i(x,u,p_j)}{\partial p_j}\xi_i\xi_j \leqslant \mu(|u|)(1+p)^{m-2}\sum_i \xi_i^2 \qquad (3)$$

$$\left|\frac{\partial a_i}{\partial p_j}\right| p^2 + \left|\frac{\partial a_i}{\partial u}\right| p + \left|\frac{\partial a}{\partial p_i}\right| p + \left|\frac{\partial a}{\partial u}\right| \leqslant \mu(|u|)(1+p)^m$$

be satisfied incidentally, where $\nu(t)$ is monotone non-increasing, $\mu(t)$ -- monotone non-decreasing, $\nu(t)$ and $\mu(t) > 0$, $t \geqslant 0$.

A function $u(x) \in W_m^1(\Omega)$ for which

$$I(u,\eta) = \int_\Omega \left[a_i(x,u,u_x)\eta_{x_i} - a(x,u,u_x)\eta\right] dx = 0 \qquad (4)$$

holds for every bounded function η of $\overset{\circ}{W}{}_m^1(\Omega)$ is called a generalized

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solution of (1).

Lemma 1: For the bounded generalized solution u(x) of (1) there hold the inequalities

$$\int_{K(\varrho)} |\nabla u|^m dx \leq c \varrho^{n-m+\alpha} \qquad (5)$$

$$\int_{K(\varrho)} |x-y|^{-n+m-\alpha/2} |\nabla u|^m dx \leq c \varrho^{\alpha/2} \qquad (6)$$

where $K(\varrho)$ is an arbitrary sphere of radius ϱ in Ω, and the constant c depends only on $\mu(\max_{\Omega} |u|)$, $\nu(\max_{\Omega} |u|)$ of (2).

Lemma 2: Every bounded generalized solution u(x) of (1) with $m \geq 2$ satisfies

$$\int_{K(\varrho)} (1+|\nabla u|)^m \xi^2 dx \leq c \varrho^{n} \int_{K(\varrho)} (1+|\nabla u|)^{m-2} |\nabla \xi|^2 dx \qquad (7)$$

for every bounded ξ of $\overset{0}{W}{}^1_m(K(\varrho))$, where the constant c depends only on $\mu(\max_{\Omega} |u|)$ and $\nu(\max_{\Omega} |u|)$ of (2).

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Lemma 2': If $b(x) > 0$, and if for every $\varrho > 0$ and $y \in \Omega$ it holds

$\int_{K(\varrho)} |x-y|^{-n+m-\alpha/2} b^m(x)dx < c_1 \varrho^{\alpha/2}$, $\alpha > 0$, $1 \leqslant m \leqslant 2$ then it holds

$$\int b^m \xi^2 dx \leqslant c \varrho^{2\alpha/m} \int_{K(\varrho)} b^{m-2} |\nabla \xi|^2 dx \qquad (8)$$

where ξ is an arbitrary ~~bounded~~ function of $\dot{W}^1_m(K(\varrho))$, and the constant c depends only on c_1, α, m.

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From lemma 2' it follows that lemma 2 holds also for $1 \leqslant m \leqslant 2$.

Theorem 1: The uniqueness theorem in the small holds for a bounded generalized solution u(x) of (1) i. e.: two bounded generalized solutions u'(x) and u"(x) being equal on the surface of K(s) are identical in K(s) if only the radius ϱ is smaller than a certain number which is determined by $\mu(\max_{\Omega} |u'|, |u''|)$ and $\nu(\max_{\Omega} |u'|, |u''|)$ of (2) and (3).

Theorem 2: If (2) and (3) are satisfied then every bounded generalized

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solution $u(x)$ of (1) has generalized second derivatives and satisfies (1) almost everywhere. For this solution it holds

$$\int_{\Omega'} \left[|\nabla u|^{m+2} + (1 + |\nabla u|)^{m-2} \sum_{i,j} u^2_{x_i x_j} \right] dx < c \subset \Omega' \quad (10)$$

where Ω' is an arbitrary strongly inner subregion of Ω. If S and $\varphi = u/s$ are two times continuously differentiable then (10) holds for $\Omega' = \Omega$ too.

Let

$$J(u) = \int_{\Omega} F(x, u, u_x)\, dx_1 dx_n, \quad u|_S = \varphi \quad . \quad (12)$$

Theorem 3: Every bounded $u(x)$ of $W^1_m(\Omega)$ for which

$\delta J(u) = \int_{\Omega} (F_{u_{x_i}}(x, u, u_x)\, \eta_{x_i} + F_u \eta)\, dx = 0$ holds for every bounded

$\eta(x) \in \overset{o}{W}{}^1_m(\Omega)$, belongs $C_{k,\alpha}(\Omega)(k \geq 3, \alpha > 0)$ if $F(x, u, p_j)$ as a function

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of all arguments belongs to $C_{k,\alpha}$ and satisfies only the "natural" assumptions of (Ref. 1: O. A. Ladyzhenskaya, N. N. Ural'tseva, DAN 135, no. 6(1960); Ref. 2: O. A. Ladyzhenskaya, N. N. Ural'tseva, Usp. matem. nauk, 16, no. 1 (1961)).

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There are 4 Soviet-bloc and 2 non-Soviet-bloc references.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet imeni A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: December 24, 1960, by V. J. Smirnov, Academician

SUBMITTED: December 20, 1960

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LADYZHENSKAYA, O.A.; URAL'TSEVA, N.N.

Boundary value problem for linear and quasi-linear parabolic equations. Dokl. AN SSSR 139 no.3:544-547 Jl '61 (MIRA 14:7)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova. Predstavleno akademikom V.I. Smirnovym.
(Boundary value problems)
(Differential equations, Linear)

LADYZHENSKAYA, O.A.; URAL'TSEVA, N.N.

Regularity of generalized solutions of quasi-linear elliptic equations. Dokl. AN SSSR 140 no.1:45-47 S-O '61. (MIRA 14:9)

1. Leningradskoye otdeleniye Matematicheskogo instituta im. V.A. Steklova AN SSSR. Predstavleno akademikom V.I.Smirnovym.
(Differential equations)

33628
S/038/62/026/001/001/003
B112/B108

16.3500

AUTHORS: Ladyzhenskaya, O. A., and Ural'tseva, N. N.

TITLE: Boundary value problem for linear and quasi-linear parabolic equations. I.

PERIODICAL: Akadimiya nauk SSSR. Izvestiya seriya Matematicheskaya, v. 26, no. 1, 1962, 5-52

TEXT: For linear parabolic equations of the form

$$Lu \equiv u_t - (\partial/\partial x_i)(a_{ij}(x,t)u_{x_j} + a_i(x,t)u + f_i(x,t)) + b_i(x,t)u_{x_i} + a(x,t)u + f(x,t) = 0$$

X

with unbounded coefficients, estimates of the Hölder norm of the solutions and of their derivatives are derived. For the solutions of general quasi-linear parabolic equations

$$\mathcal{L}u \equiv u_t - (\partial/\partial x_i)(a_i(x,t,u,u_{x_k})) + a(x,t,u,u_{x_k}) = 0$$

"with a divergent right-hand side", apriori estimates are obtained. By means of these estimates it is demonstrated that the first boundary value

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Boundary value problem for...

problem for such equations can be solved "in the large". All results are new inclusive that for the case of a single spatial variable. The conditions under which the apriori estimates are obtained and under which the solvability "in the large" is demonstrated are not only sufficient but in a certain sense also necessary. There are 37 references: 21 Soviet-bloc and 16 non-Soviet-bloc. The four references to English-language publications read as follows: Nash J., Continuity of solutions of parabolic and elliptic equations, Amer. J. Math., 80 (1958), 931-954; Friedman A., On quasi-linear parabolic equations of the second order, J. Math. and Mech., 7, No. 5 (1958), 771-791; 793-809, Morrey C. B., Second order elliptic equations in several variables and Hölder continuity, Math. Z., 72 (1959), 146-164; Friedman A., Boundary estimates for second order parabolic equations and their applications, Journ. Math. and Mech., 7, No. 5 (1958), 771-791.

SUBMITTED: May 18, 1961

X

Card 2/2

S/038/62/026/005/003/003
B112/B186

AUTHORS: Ladyzhenskaya, O. A., and Ural'tseva, N. N.

TITLE: Boundary value problems for linear and quasi-linear parabolic equations. II

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya matematicheskaya, v. 26, no. 5, 1962, 753-780

TEXT: The first boundary value problem for quasi-linear parabolic equations

$$\mathcal{L}u \equiv u_t - \sum_{i=1}^{n} da_i(x,t,u,u_{x_k})/dx_i + a(x,t,u,u_{x_k}) = 0 \qquad (1)$$

with "divergent main part" is considered from a global point of view. Local results concerning such equations have been obtained in the first part of this paper (Izvestiya Ak. nauk SSSR, seriya matemat., 26 (1962), 5-52). Global estimates of $|\nabla u|$ and of the Hölder norm of u_{x_k} are derived. From these estimates, the existence of classical solutions is

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proved for bounded and unbounded domains and, in particular, for Cauchy's problem. Special attention is paid to the theorem of existence at an arbitrary growth, with respect to problems of subsurface hydrodynamics.

SUBMITTED: February 20, 1962

Card 2/2

URAL'TSEVA, N.N.

General quasi-linear equations of second order and some classes of systems of elliptic equations. Dokl. AN SSSR 146 no.4:778-781 O '62. (MIRA 15:11)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova. Predstavleno akademikom V.I. Smirnovym.
(Linear equations) (Differential equations)

LADYZHENSKAYA, O.A.; URAL'TSEVA, N.N.

First boundary value problem for quasi-linear parabolic second-order equations of the general type. Dokl. AN SSSR 147 no.1:28-30 N '62. (MIRA 15:11)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova. Predstavleno akademikom V.I. Smirnovym.
(Boundary value problems)
(Differential equations)

42699

S/020/62/147/002/005/021
B112/B186

16.3500

AUTHOR: Ural'tseva, N. N.

TITLE: Boundary value problems for quasilinear elliptic equations and systems with divergent principal part

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 2, 1962, 313-316

TEXT: The boundary value problem $Lu \equiv \partial a_i(x,u,u_{x_k})/\partial x_i + a(x,u,u_{x_k}) = 0$, (1) $L^{(S)}u \equiv \left[a_i(x,u,u_{x_k})\cos(\vec{n},x_i) + \psi(x,u)\right]\Big|_S = 0$ (2) is considered. Besides the conditions of uniform ellipticity and of boundedness in the derivatives up to the second order, genuine conditions of agreement are imposed. The existence of a unique solution $u(x) \in C_{2,\alpha}(\Omega)$ is proved on the basis of an estimate derived for $|u|_{C_{1,\alpha}(\Omega)}$, together with estimates of the Schauder type concerning solutions of linear equations, especially those of R. Fiorenza (Ric. Mat., 8, No. 1, 83 (1959)).

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Boundary value problems...

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: June 4, by V. I. Smirnov, Academician

SUBMITTED: May 24, 1962

Card 2/2

LADYZHENSKAYA, O. A.; URAL'TSEVA, N. N.

On possible extensions of the concept of solution for linear and quasi-linear second-order elliptic equations. Vest. LGU 18 no.1:10-25 '63. (MIRA 16:1)

(Differential equations)

45652

S/038/63/027/001/004/004
B112/B186

16,3500

AUTHORS: Ladyzhenskaya, O. A., and Ural'tseva, N. N.

TITLE: Boundary-value problem for linear and quasilinear equations and systems of the parabolic type. III

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya matematicheskaya, v. 27, no. 1, 1963, 161-240

TEXT: General quasilinear equations

$$\mathcal{L}u \equiv u_t - \sum_{i,j=1}^{n} a_{ij}(x, t, u, u_{x_k}) u_{x_i x_j} + a(x, t, u, u_{x_k}) = 0, \qquad (1)$$

and parabolic systems

$$u_t^l - \sum_{i=1}^{n} \frac{d}{dx_i}\Big(\sum_{j=1}^{n} a_{ij}(x, t) u_{x_j}^l + \sum_{m=1}^{N} a_i^{lm}(x, t) u^m + f_i^l(x, t)\Big) +$$

$$+ \sum_{i=1}^{n}\sum_{m=1}^{N} b_i^{lm}(x, t) u_{x_i}^m + \sum_{m=1}^{N} b^{lm}(x, t) u^m + f^l(x, t) = 0, \quad l = 1, \ldots, N, \quad (2)$$

$$u_t^l - \sum_{i,j=1}^{n} a_{ij}(x, t, u^m) u_{x_i x_j}^l + a^l(x, t, u^m, u_{x_k}^m) = 0, \quad l = 1, \ldots, N, \quad (3)$$

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S/038/63/027/001/004/004
B112/B186

Boundary-value problem for linear ...

are considered. A priori estimates of several Hölder norms are derived and the unambiguous solvability of the first boundary-value problem as a whole is demonstrated.

SUBMITTED: July 9, 1962

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APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001858010020-6"

LADYZHENSKAYA, Ol'ga Aleksandrovna; URAL'TSEVA, Nina Nikolayevna;
SOLOMYAK, M.Z., red.

[Linear and quasilinear elliptic equations] Lineinye i kvazilineinye uravneniia ellipticheskogo tipa. Moskva, Nauka, 1964. 538 p. (MIRA 18:1)

ACCESSION NR: AP4034025 S/0020/64/155/006/1258/1261

AUTHOR: Lady*zhenskaya, O. A.; Ural'tseva, N. N.

TITLE: On Hölder-continuity of solutions, and derivatives of solutions, of linear and quasi-linear equations of elliptic and parabolic type.

SOURCE: AN SSSR. Doklady*, v. 155, no. 6, 1964, 1258-1261

TOPIC TAGS: partial differential equation, second order, elliptic equation, elliptic system, parabolic equation, parabolic system, generalized solution

ABSTRACT: In a series of (seven) earlier papers the authors have studied equations of elliptic or parabolic type, of the forms

$$\mathcal{L}_1 u \equiv \frac{\partial}{\partial x_i}(a_{ij}(x)\, u_{x_j} + a_i(x)\, u) + b_i(x)\, u_{x_i} + c(x)\, u = f(x), \quad (1)$$

$$\mathcal{L}_2 u \equiv \frac{\partial u}{\partial t} - \frac{\partial}{\partial x_i}(a_{ij}(x, t)\, u_{x_j} + a_i(x, t)\, u) + b_i(x, t)\, u_{x_i} + c(x, t)\, u = f(x, t), \quad (2)$$

$$\mathcal{L}_3 u \equiv \frac{\partial}{\partial x_i}(a_i(x, u, u_x)) + a(x, u, u_x) = 0, \quad (3) \qquad \mathcal{L}_6 u \equiv u_t - a_{ij}(x, t, u, u_x)\, u_{x_i x_j} + a(x, t, u, u_x) = 0 \quad (6)$$

$$\mathcal{L}_4 u \equiv \frac{\partial u}{\partial t} - \frac{\partial}{\partial x_i}(a_i(x, t, u, u_x)) + a(x, t, u, u_x) = 0, (4) \quad \mathcal{L}_5 u \equiv a_{ij}(x, u, u_x)\, u_{x_i x_j} + a(x, u, u_x) = 0. \quad (5)$$

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ACCESSION NR: AP4034025

and certain systems of such equations. One of the main objects of their work was investigating the Hölder-continuity of the solutions and their derivatives, as well as getting estimates for their Hölder norms in terms of constants depending on the coefficient functions. By constructing special examples, they have shown that in a certain sense, their results cannot be improved. Assuming that the solutions under consideration are bounded and have a certain degree of smoothness, it was shown that every solution u of equations (1) - (4) as well as each u_{x_k} belong to a certain class B; the gradient with respect to x of every solution of (5) or (6) belongs to a certain class B^N. (A function belongs to such a class if it satisfies certain inequalities involving free parameters.) Then it was proved that the functions in the various B classes are Hölder-continuous and that their Hölder norm can be estimated in terms of the numerical parameters defining B. The object of this paper is to present a shorter method of proof, by-passing the study of the B-classes. The reasoning is based on lemmas from the earlier papers and a new lemma, concerning functions in the class $W_2^1(K_2)$, where $K_2 = \{(x) \leq 2\}$. Since the results are those which were presented earlier, they are not re-stated here. Instead, the method is illustrated on the example

$$u_t - \frac{\partial}{\partial x_i}(a_{ij}(x, t)\, u_{x_j}) = 0 \qquad (7)$$

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ACCESSION NR: AP4034025

to which corresponds the integral identity

$$\int (u_t\eta + a_{ij}u_{x_j}\eta_{x_i})\,dx = 0, \qquad (8)$$

where η is a smooth function, finite in the region under consideration. The main part of the argument consists in showing that if a solution $u(x,t)$ of (7) is defined in the cylinder $Q_2 = K_2 \times [0,a]$ and if its range is $[0,1]$, then

$$\operatorname{osc}(u, Q_1) \leqslant \eta \operatorname{osc}(u, Q_2) = \eta, \qquad (10)$$

where Q_1 is the cylinder $K_1 \times [3/4a, a]$, $K_1 = \{|x| \leq 1\}$. Then the full statement [too long to be repeated here] of the result for (generalized) solutions of (3) is given, followed by an outline of the method to be used in the case of equations (5) and (6). Orig. art. has: 16 equations.

ASSOCIATION: Leningradskoye otdelenie Matematicheskogo instituta im. V. A. Steklova Akademii nauk SSSR (Leningrad Division of the Mathematics Institute Academy of Sciences, SSSR)

SUBMITTED: 18Dec63 ENCL: 00

Card 3/4

ACCESSION NR: AP4034025

SUB CODE: MA NO REF SOV: 001 OTHER: 001

Card 4/4

ACCESSION NR: A... ...

AUTHORS: Lady*zhenskaya, ... A. ... ...

TITLE: Classical solvability of diffraction problems for equations of the elliptical and parabolic type 16

SOURCE: AN SSSR. Doklady*, v. 158, no. 3, 1964, 513-515

TOPIC TAGS: diffraction analysis, boundary value problem, elliptic differential equation, parabolic differential equation, existence theorem

ABSTRACT: In an earlier paper, one of the authors (Lady*zhenskaya, DAN 96, No. 3, 433, 1954) proved that diffraction problems can be re... ... ...dary problems for which various solution methods are ava... ... ...ereby proving the ... ...bility of diffraction problems. Furthermore, it was pointed out that more accurate to the diffraction problems can be obtained by

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ACCESSION NR: AP4046364

making more precise the formulation of the corresponding boundary
and initial-boundary value problems. It was pointed out, however,
that the results obtained for elliptic and parabolic equations are
quite crude. Following a later development of new methods for the
investigation of differential properties of generalized solutions
(Lady*zhenskaya and Ural'tseva, Izv. AN SSSR ser. matem. v. 26, No.
1, 5, 1962; UMN, v. 26, No. [illegible], 19, 1961) which led to more accurate
relationships between the differential properties of the generalized
[illegible] of elliptic [illegible] and the differential
properties of the coefficients of the equation, it has become possi-
ble to refine the results for elliptic and parabolic diffraction
problems. Two problems of this type are solved by way of an example
and several theorems proved concerning the solvability of these
problems. This report was presented by V. I. Smirnov. Orig. art.
has: 14 formulas.

ASSOCIATION: Leningradskoye otdeleniye Matematicheskogo instituta

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ACCESSION NR: AP4046364

im. V. A. Steklova Akademii nauk SSSR (Leningrad Division, Mathematics Institute, Academy of Sciences SSSR)

SUBMITTED: 15Apr64 ENCL: 00

SUB CODE: MA NR REF SOV: 009 OTHER: 000

Card 3/3

Card

URAM, B J.

URAM, J.

Penicillin in seroresistant syphilis. Bratisl. lek. listy 30:6-7, June-July 50. p. 557-60

1. Of the Dermato-Venereological Clinic of the Medical Faculty of Slovak University in Bratislava (Head--Prof. Jan Treger, M. D.).

CLML 20, 3, March 1951

URAM, J.

REHAK, A.; DRGONEC, J.; URAM, J.; OSUSKY, J.

Observations on the cutaneous tests for syphilis with the preparation luotest. Bratisl. lek. listy. 30 no.8-10:700-704 Aug-Oct 50. (CIML 20:4)

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URAMAKHER, L.S.

Stereophotogrammetric chamber for photographing the anterior section of the eye. Med.prom. 11 no.12:56-59 D '57. (MIRA 11:2)
(EYE, INSTRUMENTS AND APPARATUS FOR)
(PHOTOGRAMMETRY)

URAN, D.

"Cutting metals with oxyacetylene flame."
Varilna Tehnika, Ljubljana, Vol 1, No 3, 1952, p. 29

SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001858010020-6"

URAN, D.

URAN, D. Repair metallization. p. 16

Vol. 4, no. 1/4, 1955
VARILNA TEHNIKA
TECHNOLOGY
Ljubljana

So: East European Accession, Vol. 6, no. 3, March 1957

URAN, D.

Survey of Yugoslav welding technique. p. 11.

ZVARANIE Vol. 5, no. 1, Jan. 1956

Czechoslovakia

Source: EAST EUROPEAN LISTS Vol. 5, no. 7 July 1956

URAN, D.

Gluing of metals. p.51

VARILNA TEHNIKA. (Drustvo za varilno tehniko LRS in Zavod za varjenje LRS
Ljubljana, Yugoslavia. Vol. 7, no.3/4, 1958

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Nov. 1959
Uncl.

URAN, Dobromil, inz.,prof.

Welding of equipment on furnaces. Var teh 10 no.4:120 '61.

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"Welding and allied processes in maintenance and repair work." Reviewed by D.Uran. Stroj vest 8 no.1/2:29 Ap '62.

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URAN, D.

"History of the German internal-combustion engines" by F. Sass. Reviewed by D. Uran. Stroj vest 8 no.4/5:118 O '62.

URAN, Demetrij, ing.

Automatic control and analog computers. Automatika 2 no.3:138-142 Ag '61.

(Automatic control) (Calculating machines)

URAN, Demetrij, ing.; ZELEZNIKAR, Anton, ing.

Third international conference for analog computers, Opatija, September 4-9, 1961. Automatika 2 no.4:245 O '61.

URAN, Demetrij, inz. (Ljubljana)

Application of analog computers in designing automatic controllers. Automacija Zagreb 2 no. 2/4:89-93 '62.

1. The Jozef Stefan Nuclear Institute, Ljubljana (P.O.B.199).

DRAGEL', F.F.; URANBILEG, G. (Ulan-Bator)

Impossibility of extubation of the endotracheal tube when the inflating cuff has ruptured. Grud. khir. 6 no.1:111 Ja-F '64. (MIRA 18:11)

URANIC, Medan, dipl. inz. rudarstva

Building the new sloping track in the Kocevje Brown Coal Mine for coal carting. Rud met zbor no. 2:175-184 '64.

1. Kocevje Brown Coal Mine, Kocevje.

URANOSOV, A.A.

Unpublished designs of Russian sawmills in the 17th century. Vop. ist.est. i tekh. no.2:282-286 '56. (MIRA 10:1)
(Structural drawing--History)
(Sawmills--History)

URANOSOV, A.A.

Coats-of-arms of Russian cities during the 18th century as sources for the history of technology. Trudy Inst.ist.est.i tekh. 7:225-232 '56. (Devices) (Technology--History) (MLRA 9:9)

URANOSOV, A.A.

An attempt at constructing a forced water supply line in the Simonov Monastery of Moscow. Trudy Inst. ist. est. i tekh. 7:251-254 '56. (MIRA 9:9)
(Moscow--Monasteries)

BOBKOV, A., kandidat tekhnicheskikh nauk; URANOSOV, A., kandidat istoricheskikh nauk.

Moscow Kremlin. Stroitel' 2 no.4-5:42-43 Ap-My '56. (MIRA 10:1)
(Moscow--Kremlin--History)

URANOSOV, A.A.

Unpublished design and description of a mill of the 17th century. Vop. ist. est. i tekh. no.4:187-188 '57. (MIRA 11:1)
(Mill and factory buildings--History)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001858010020-6"

URANOSOV, A.A.

History of the composition of "Book of comments on the Great Map." Vop. ist. est. i tekh. no.4:188-190 '57. (MIRA 11:1)
(Russia--Historical geography)

Uranosov, A.A.

URANOSOV, A.A.; EL'MAN, M.D.; DRUCHKOVA, T.V.

In the Institute of the History of Natural Sciences and Technology of the Academy of Sciences of the U.S.S.R. Vop. ist. est. i tekh. no.4:207-209 '57. (MIRA 11:1)
(Academy of Sciences of the U.S.S.R.)

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In the scientific council of the Institute of the History of Natural Sciences and Technology of the Academy of Sciences. Vop.ist.est. i tekh. no.5:224-225 '57. (MIRA 11:2)

(Academy of Sciences of the U.S.S.R.)

URANOSOV, A.; N.E. ZHUKOVAKI,

The father of Russian aviation. p.10.
(Aripile Patriel, Vol. 3, No. 1. Jan 1957, Bucuresti, Rumania)

SO: Monthly Listof East European Accessions (EEAL) Lc. Vol. 6, No1 8, Aug 1957. Uncl.

URANOSOV, A.A.

The 350th anniversary of the birth of Evangelista Torricelli.
Vop.ist.est.i tekh. no.8:182-183 '59. (MIRA 13:5)
(Torricelli, Evangelista, 1608-1647)

URANOSOV, A.A.; FEDCHINA, V.N. (Moskva)

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(Soviet Far East--Discovery and exploration--Bibliography)

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KUL'TIASOV, M.V., prof.; URANOV, A.A., dots.; GENKEL', P.A., prof., red.; PONOMAREVA, A.A., tekhn. red.

[Programs of pedagogical institutes; botany for natural science faculties] Programmy pedagogicheskikh institutov; botanika dlia fakul'tetov estestvoznaniia. [Moskva] Uchpedgiz, 1955. 31 p. (MIRA 11:9)

1. Russia (1917- R.S.F.S.R.) Glavnoye upravleniye vysshikh i srednikh pedagogicheskikh uchebnykh zavedeniy.
(Botany--Study and teaching)

URANOV, A.A.

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(Botany--Ecology) (MLRA 8:9)

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[Programs of pedagogical institutes; summer field work in botany for natural science faculties] Programmy pedagogicheskikh institutov; letniaia uchebnopolevaia praktika po botanike dlia fakul'tetov estestvoznaniia. [Moskva] Uchpedgiz, 1956. 14 p. (MIRA 11:9)

1. Russia (1917- R.S.F.S.R.) Glavnoye upravleniye vysshikh i srednikh pedagogicheskikh uchebnykh zavedeniy.
(Botany--Study and teaching)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R001858010020-6"

KHIL'MI, G.F.; DZERDZEYEVSKIY, B.L., professor, otvetstvennyy redaktor; URANOV, A.A., professor, otvetstvennyy redaktor; STAROSTENKOVA, M.M., redaktor izdatel'stva; MAKUNI, Ye.V., tekhnicheskiy redaktor

[Theoretical biogeophysics of forests] Teoreticheskaia biogeofizika lesa. Moskva, Izd-vo Akad. nauk SSSR, 1957. 204 p. (MIRA 10:8)
(Forests and forestry)

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KURSANOV, L.I., prof.; KOMARNITSKIY, N.A.; MEYYER, K.I., prof.; RAZDORSKIY, V.F., prof.; URANOV, A.A.; RYBAKOV, N.f., red.; SMIRNOVA M.I., tekhn. red.

[Botany; a textbook for pedagogical institutes and universities. Vol.1. Anatomy and morphology] Botanika; uchebnik dlia pedagogicheskikh institutov i universitetov. Izd.6. S ispr. i pod red. N.A. Komarnitskogo. Moskva, Gos. uchebno-pedagog. izd-vo M-va prosv. RSFSR. Vol.1. Anatomiia i morfologiia. 1958. 419 p. (MIRA 11:7)
(Botany--Anatomy) (Botany--Morphology)

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(PHYTOSOCIOLOGY)

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(Botany—Classification)

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State Pedagogical Inst, Moscow.

URANOV, Aleksey Aleksandrovich; KUDRYASHOV, L.V., doktor biol. nauk, retsenzent; NEKHLYUDOVA, A.S., red.

[Observations during the summer practical work on botany; an aid for students] Nabliudeniia na letnoi praktike po botanike; posobie dlia studentov. Izd.2., perer. i dop. Moskva, Prosveshchenie, 1964. 213 p. (MIRA 18:3)

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

CA

Combining Pechory asphalt with linseed oil. S. A. Urazov and E. N. Orlova. *Byull. Lako-Krasochnoi Prom.* 1938, No. 4, 21-6; *Khim. Referat. Zhur.* 2, No. 1, 102(1939).—The enriched Pechory asphaltite (asphaltenes 54.24%, carbenes, 2.20%, carboids 0.08% and ash 0.20%) was fused with oil in the ratios of asphaltite to oil 1:1, 1:2 and 2:1. By dilg. the lacquers with 200-500 cc. of lacquer kerosene a part of the highly carbonized components (25-30% of the wt. of asphaltite) was pptd. A min. pptn. was obtained with the ratio asphalt:oil = 1:2. The amt. of the assimilated highly carbonized components decreased with diln. This dependence is observed least with asphalt:oil = 1:2. Lacquer kerosene is not suitable for the detn. of the combining ability of the asphalts. Turpentine is suitable. It is proposed to call the "true combining ability" of asphalt with oil expressed in percentage the ratio of the assimilated (not sepd. with turpentine), highly carbonized components to the total asphalt content. W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

CA

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Investigation of the Sadkin asphaltite. S. A. Utanov and N. B. Rukina. *Byull. Lako-Krasochnoi Prom.* 1938, No. 5, 24-8; *Khim. Referat. Zhur.* 1, No. 2, 120(1939).—Samples taken from a depth of from 17 to 35 m. showed that the Sadkin asphaltite is nearly pure bitumen contg. only 0.8% of ash. The content of the asphaltogenic acids varies from 0.77 to 2.3%. The combining power of asphaltite with linseed oil is smallest at the ratio of 1 2. At 2 1 asphaltite combines with the oil practically completely.

W. R. Henn

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

Purification of "Sadkin" asphaltite. S. A. Lianov, N. B. Riskina and A. I. Frolova. *Byull. Obmen Opyt. Lakokrasochnoi Prom.* **1939**, No. 6-7, 34-6; cf. C. A. 34, 898[9].—Heating of "Sadkin" asphaltite until it has 40 meters of "horizon" at 320° lowers considerably its varnish qualities. Asphaltites with a horizon less than 40 m. possess better composition and varnish properties than those having more than 40-m. horizon. D. Aclony

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

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PROCESSES AND PROPERTIES INDEX

Causes of thickening and coagulation of asphalt lacquers. S. A. Uranov, E. N. Orlova and L. A. Pneva. *Byull. Obmena Opyt. Lakokrasochnoi Prom.* 1939, No. 8, 21-3.—Rosin, "garpius" ether and calcium resinate (6%) were melted with asphaltenes. When dissolved in petroleum ether these "melts" contained 5 15% of the asphaltenes; the rest settled out. Very little asphaltene went into soln. from Ca resinate melt. The 3 melts were treated with 3, 2 and 1 part of linseed oil per part of melt. When taken up in petroleum ether the 1:3 ratio gave 63.8% asphaltene sediment for the Ca resinate melt, 70.42% residue for the "garpius" ether melt and 74.05% for the rosin melt. When smaller amts. of oil were used the sediment was greater. A study of the viscosities of the C_6H_6 solns. of asphaltenes, oils and resin sepd. from enriched Pechersk asphaltite was undertaken. In 3 months 5% solns. change their viscosity only by 7 sec. while the viscosity of 10% solns. doubled during the same period. The viscosities of solns. of resins and oils remained stable irrespective of concns. during 3 months.

David Aelony

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

CA

The purification of Sadkin asphaltite for use in oil varnishes S. A. Usanov, N. V. Ryskina and A. I. Frolova. *Byull. Obmena Opyt. Lakokrasochnoi Prom.* 1939, No. 8, 10-12; *Khim. Referat. Zhur.* 1940, No. 7, 97-8; cf. C. A. 34, 6404[5].—The effect of melting asphaltites from various horizons of the Sadkin deposits on their compn. and comforming properties with linseed oil were investigated. Melting at 350° aggravates the varnish properties of asphaltites, owing to the accumulation of components with high contents of C. Asphaltites from horizons deeper than 40 m. possess better varnish properties than do asphaltites from the higher horizons. W. R. Henn

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES

1 Ca 26

Mixtures of Sadki asphaltite with petroleum resins. . Uranov and N. B. Riskina. *Byull. Obmen Opyt. Lakokrasochnoi Prom.* **1940**, No. 1, 23-4.—Sadki asphaltite should be changed from a bitumen rich in compds. high in C to one having a higher proportion of oil-resin components. The data show that semiliquid petroleum resins when melted with Sadki asphaltite improve its soly. in oils. Good varnishes were obtained from asphaltite thus treated; it gelled, however, in white spirits and turpentine had to be used instead of white spirits. David Aelony

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

A new constant characterizing varnish asphalts. S. A. Ulanov and N. B. Riskina. *Byull. Obmen Opyt Lakokrasochnoi Prom.* 1940, No. 1, 19-21. A new const. F = oils + resins/asphaltenes + carbenes + carboids is proposed. This const. is claimed to be characteristic of various bitumens and is claimed to be a measure of their usefulness in varnishes. Bitumens with F not less than 1 have better varnish properties than those having F less than 1 (and particularly if F = 0.29-0.6). Although F = 0.7-0.8 is satisfactory for natural bitumens, this value gives unsatisfactory varnishes for petroleum bitumens. D. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Paste polishes for automobiles. S. A. [illegible]. *Byull. Obmena Opyt. Lakokrasochnoi Prom.* **1940**, No. 6, 22-4. The following paste polish was accepted by *Zis* auto works: water 10.35, household soap 4.05, glycerol 0.75, kerosene 10.3, dibutyl phthalate 3.55, abrasive 50%. The paste was homogenized in a paint mill. David Aelony

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

RASKIN, Ya.L.; URANOV, S.A.; TATARINOVA, T.L.

Benzene-resistant paints and coatings. Lakokras.mat.i ikh.prim. no.3:13-19 '60. (MIRA 14:4)

(Protective coatings)

SHULYAT'YEV, I.I.; BADALOVA, A.S., starshiy nauchnyy sotrudnik; URANOVA, A.S., mladshiy nauchnyy sotrudnik

One-process "T-16" picker. Tekst. prom. 19 no.7:39-42 Jl '59. (MIRA 12:11)

1.Zaveduyushchiy tsentral'noy laboratoriyey ramenskogo khlopchatobumazhnogo kombinata "Krasnoye znamya" (for Shulyat'yev). 2.TSentral'nyy nauchno-issledovatel'skiy institut khlopchatobumazhnoy promyshlennosti (TsNIKhBI) (for Badalova). 3.Vsesoyuznyy nauchno-issledovatel'skiy institut tekstil'nogo i legkogo mashinostroyeniya (VNILLTekmash) (for Uranova).
(Spinning machinery)

EXCERPTA MEDICA Sec 16 Vol 7/9 Cancer Sept 59

4011. **Pigmented tumours of the pia mater (Russian text)** URANOVA E. V. and VOLODIN N. I. Central Post-Grad. Sch. of Med. and Botkin Hosp., Moscow *Vopr. Onkol.* 1959, 5/1 (54-59) Illus. 5

Three cases of primary pigmented tumours of the pia mater are described. In one case with diffuse spread along the membrane of the brain and spinal cord, the tumour consisted of non-differentiated large round cells. The other 2 observations dealt with mature and immature types of nodular melanoma. Arachnoidal structures were found at histological examination of the tumour. By the peculiarities of growth and histological structure it can be concluded that the common neuroectodermal embryonic structures are the site of origin of such tumours, both for pigmented cells and the arachnoid endothelium.

S/050/63/000/003/001/003
D207/D308

AUTHOR: Uranova, L.A.

TITLE: Seasonal characteristics of the lower-stratosphere (isosphere) structure at high and temperate latitudes

PERIODICAL: Meteorologiya i gidrologiya, no. 3, 1963, 13-20

TEXT: An analysis was made of air temperatures measured by radiosonde ascents to 15-30 km at Alert (82° N, 70° W), Barrow (71° N, 155° W), Keflavik (64° N, 21° W) and Guzbey (54° N, 61° W) during the IGY and IGC (1957-9). The principal conclusion was that below the isopause the vertical temperature gradient is on the average close to zero, but above the isopause the vertical gradient is negative and its absolute magnitude much greater than in the isosphere. This confirms that it is valid to separate out a special layer known as the isosphere, at high and temperate latitudes. There are 5 figures and 3 tables.

ASSOCIATION: Tsentral'nyy institut prognozov (Central Forecasting Institute)

Card 1/1

L 35582-65 EPF(c)/EPR/EWG(j)/EWG(v)/EWT(1)/EWT(m)/EEC(t)/EWP(b)/FCC/EWP(t) Pe-5/Pi-4/Po-4/Pq-4/Pr-4/Ps-4/Pt-10 IJP(c) GW/JD

ACCESSION NR: AP5004889 S/0050/65/000/002/0020/0024

AUTHOR: Uranova, L. A.

TITLE: The position of the isopause in stratospheric cyclones and anticyclones and the relationship of its height to the vertical distribution of ozone

SOURCE: Meteorologiya i gidrologiya, no. 2, 1965, 20-24

TOPIC TAGS: meteorology, atmosphere, cyclone, anticyclone, isobaric potential, ozone

ABSTRACT: The location of the isopause in stratospheric cyclones and anticyclones in various seasons was studied, and an effort was made to find the relationship [illegible]

Card 1/4

L 35582-65

ACCESSION NR: AP5004889

Meteorologiya i gidrologiya, No. 3, 1963). Test data revealed that the temperature at the isopause level in a cyclone is always lower than that in an anticyclone. Test readings are tabulated and also plotted as shown in Fig. 1 on the Enclosure. Ozone density plots are given in Fig. 2 on the Enclosure. The author concluded that the reason for isopause existence at a certain altitude is very likely the presence of maximum concentration of ozone at that altitude. The tropopause corresponds to the lower limit of ozone distribution, and little or no ozone is detectable below the tropopause. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Tsentral'nyy institut prognozov (Central Forecasting Institute)

SUBMITTED: 03Sep64 ENCL: 02 SUB CODE: ES

NO REF SOV: 006 OTHER: 002

Card 2/4

L 35582-65

ACCESSION NR: AP5004889 ENCLOSURE: 01

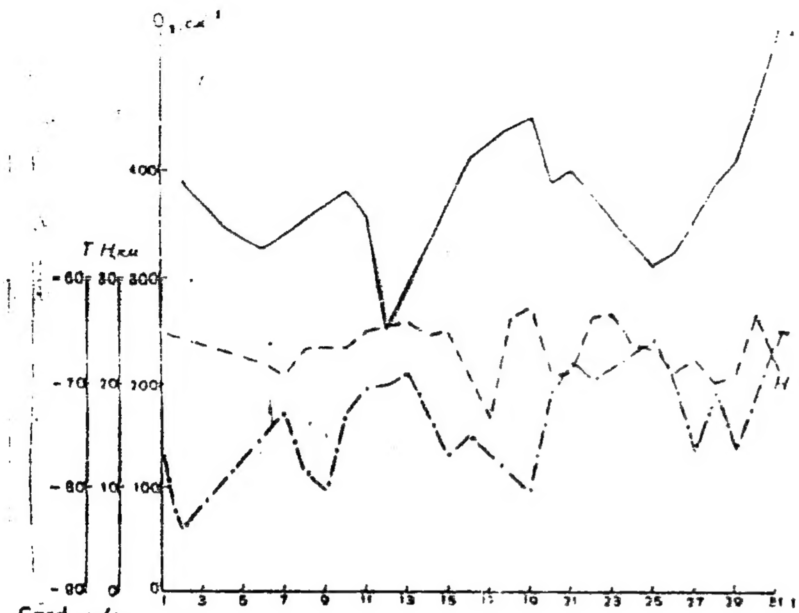

Fig. 1. Isopause height (H), temperature at that level (T) in Goose Bay, and the general quantity of ozone (O_3) in Caribou, January, 1962

Card 3/4

L 35582-65

ACCESSION NR: AP5004889

ENCLOSURE: 05

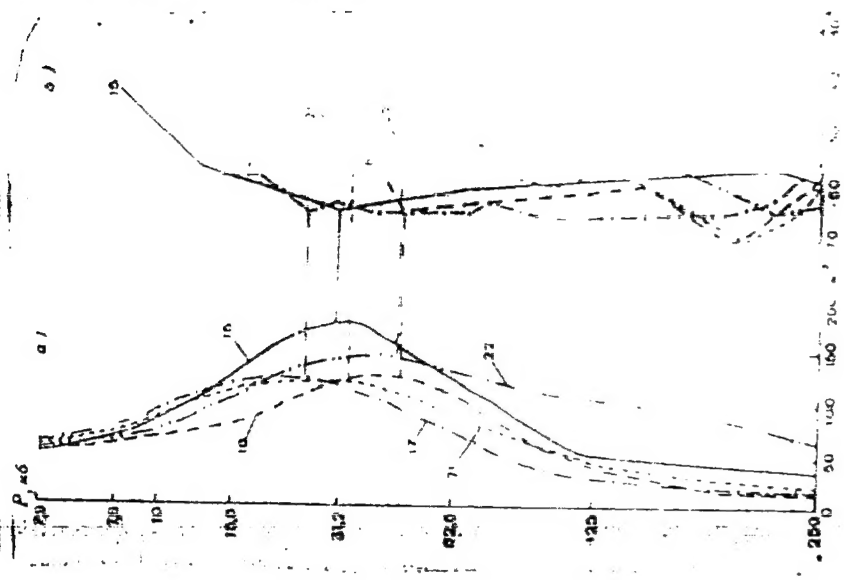

Fig. 2. Vertical distribution of ozone (a) in Arosa and the temperature (b) in Berlin, 15-17 January, and in Munich, 21 and 22 January, 1962

Card 4/4

L 55055-65 EWT(1)/FCC GW

ACCESSION NR: AT5016800 UR/2546/65/000/146/0136/0144

AUTHOR: Uranova, L. A.

B+1

TITLE: The structure of stratospheric cyclones and anticyclones in different seasons

SOURCE: Moscow. Tsentral'nyy institut prognozov. Trudy, no. 146, 1965. [illegible] gidrometeorologicheskikh yavleni [illegible] phenomena), 136-144

TOPIC TAGS: stratospheric cyclone, stratospheric anticyclone, lapse rate, stratosphere structure, isopause, isosphere

ABSTRACT: An analysis is made of data obtained for the vertical profiles of cyclones and anticyclones in the stratosphere in the upper and middle latitudes at different seasons. The isosphere, which contains a maximum [illegible] substantially [illegible] the temperature [illegible] the isopause, [illegible] The analysis shows that in stratospheric anticyclones the isopause

Card 1/3